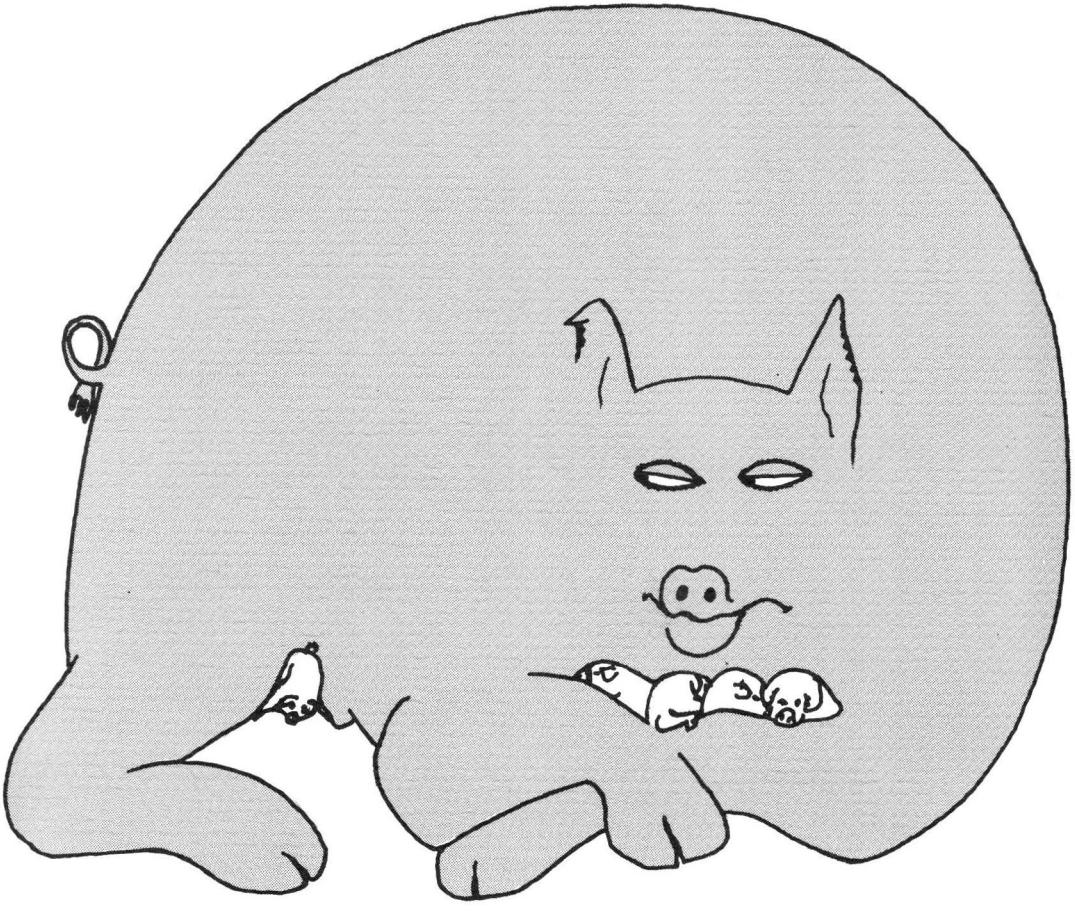
COOPERATIVE EXTENSION SERVICE
UNIVERSITY OF HAWAII
CIRCULAR 412



MANAGEMENT AND FEEDING OF SOW AND LITTER

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INTRODUCTION

The period from farrowing to weaning is one of the most critical phases in a swine operation. Studies have shown that about 30 percent of all pigs farrowed alive die before they are 8 weeks of age. Good management practices coordinating feeding, housing-equipment, and disease control, will greatly determine the number of pigs weaned and subsequent profit. This circular discusses the management and feeding of sow and litter before, during, and after the farrowing period.

BEFORE FARROWING

Sanitation and Disease Prevention

There is no substitute for sanitation in intensified swine production. Farrowing facilities should receive special attention before sows are brought in to farrow. General rules for an effective sanitation program are:

1. Clean pen surfaces thoroughly to remove manure and dirt. Disease organisms will remain and disinfectants will not penetrate if any foreign material remains. Cracks and crevices in floors, walls, and troughs should be repaired. High-pressure water or steam is effective for cleaning.

2. Use disinfectants after cleaning. More effective penetration is obtained if the disinfectant solution is heated and if adequate time—2 to 3 days—is allowed for the disinfectant to act. Directions on the use of disinfectants always should be carefully followed. (Caution: Some disinfectants are poison. Be sure to read the label, and follow the instructions thereon for all applications of use. Also, when not in use be sure to store out of reach of children and pets, and other animals. Heed all warnings posted on the label and be sure you know the antidotes that apply before using any poison). Commonly used disinfectants are:

    a. Hot lye solution. For general use, mix 1 pound of lye to 10 gallons of water. For a brucellosis clean-up program, use a 2-percent lye solution made from one 13-ounce can of lye in 5 gallons of water. Concentrated lye is a caustic poison so avoid contact with the skin. A bottle of vinegar should be kept handy to neutralize any of the solution that may get on the skin.

Table 1 Effectiveness of available worming products on swine internal parasites

	Large roundworm (Ascaris)	Nodular worm (Oesophagostomum)	Whipworm (Trichuris)	Lungworm (Metastongylus)	Intestinal threadworm (Strongyloides)	Stomach worm (red: Hyostrongylus, thick: Ascarops Physocephalus)
Piperazine	x	x				
Cadmium compounds	x					
Hygromycin	x	x	x			x-red species
Dichlorvos (Atgard)*	x	x	x			x-red species
Levamisole (Tramisol)	x	x		x		x-red species
Parantel tartrate (Banmith)	x					
Thiabendazole (Thibenzole)		x			x	x-red species
Carbon Disulfide						x-thick species

*Trade names are shown in parentheses

b. Sodium carbonate (washing ing soda or soda ash). Use 1 pound of sodium carbonate in 3 gallons of water.

c. Saponated solution of cresol. A 2- or 3-percent solution is generally used. Since the solubility is low, it is advisable to use compounds of cresol with soaps that are readily soluble.

d. Sodium orthophenylphenate. This is a proven disinfectant which is not poisonous and is soluble in water. It is normally used in a 1-percent solution.

3. Allow a time interval between groups of sows farrowing in the same facility. This should be done to break any disease cycle that may exist and to prevent disease build-up.

4. Maintain an effective fly, bird, rodent, and pet control program.

The effect of any sanitation program is lost if diseased animals are brought into the farrowing unit. An overall herd health program should be geared toward prevention rather than treatment of disease. When disease problems do arise, consult the local veterinarian early rather than calling on him as a last resort.

Ten to 14 days before farrowing, sows should be wormed. Several worming compounds are available on the market. Table 1 lists some of the more commonly used worming products and the internal parasites against which they are effective. At all times, the manufacturer's recommendations for use should be followed accurately.

Before being brought into the farrowing unit, sows should be inspected for the presence of external parasites. Eradication treatments for mange and lice are quite similar; consequently, the control of one will usually take care of the other.

Immediately before being placed in the farrowing pen, sows should be washed with soap and water with special attention paid to the udder. If sows have recently been sprayed for external parasites, wash the udders thoroughly so that the toxic effect of the insecticide does not carry over to the baby pig.

Feeding and Management of the Sow

The feeding program of the sow during gestation determines, to a large extent, the number and size of pigs born. The condition of the sows should be so regulated that they are neither too fat nor too thin at farrowing time. Overly fat sows may have difficulty in farrowing and give birth to weak or dead pigs. Sows that are in thin condition at farrowing tend to become suckled down during lactation. Avoid drastic changes in the sow's ration or feeding program during the last few days of gestation to prevent any upset in the sow's system which might interfere with normal lactation or cause digestive disorders in the baby pig.

Because of possible injury, sows should not be overcrowded. They should not be allowed to walk through narrow doors or across high door sills.

It is advisable to move sows into the farrowing house a minimum of 2 or 3 days, preferably 1 week, be-

fore farrowing. This practice allows the sows to become more at ease and adjusted to the new surroundings. Sows normally farrow about 113 days after breeding (range 110 to 116 days). Table 2 gives approximate farrowing dates of sows according to breeding dates. If breeding dates are not known, sows should be checked daily to watch for milk forming in the udder. One to 2 days before farrowing, most sows begin to make nest. The vulva begins to soften and enlarge and the udder starts to swell. When small drops of milk can be squeezed out of the nipples, farrowing will usually occur in 12 to 24 hours.

Table 2. Farrowing dates of sows according to breeding dates.

Range of Gestation.....110-116 days
Recurrence of Heat.....21 days Av.
Duration of Heat.....2-3 days Av.

Date Bred	Due to Farrow	Date Bred	Due to Farrow	Date Bred	Due to Farrow
Jan. 1	April 24	May 1	Aug. 22	Sept. 3	Dec. 25
Jan. 6	April 29	May 6	Aug. 27	Sept. 8	Dec. 30
Jan. 11	May 4	May 11	Sept. 1	Sept. 13	Jan. 4
Jan. 16	May 9	May 16	Sept. 6	Sept. 18	Jan. 9
Jan. 21	May 14	May 21	Sept. 11	Sept. 23	Jan. 14
Jan. 26	May 19	May 26	Sept. 16	Sept. 28	Jan. 19
Jan. 31	May 24	May 31	Sept. 21		
				Oct. 3	Jan. 24
Feb. 5	May 29	June 5	Sept. 26	Oct. 8	Jan. 29
Feb. 10	June 3	June 10	Oct. 1	Oct. 13	Feb. 3
Feb. 15	June 8	June 15	Oct. 6	Oct. 18	Feb. 8
Feb. 20	June 13	June 20	Oct. 11	Oct. 23	Feb. 13
Feb. 25	June 18	June 25	Oct. 16	Oct. 28	Feb. 18
		June 30	Oct. 21		
Mar. 2	June 23			Nov. 2	Feb. 23
Mar. 7	June 28	July 5	Oct. 26	Nov. 7	Feb. 28
Mar. 12	July 3	July 10	Oct. 31	Nov. 12	Mar. 5
Mar. 17	July 8	July 15	Nov. 5	Nov. 17	Mar. 10
Mar. 22	July 13	July 20	Nov. 10	Nov. 22	Mar. 15
Mar. 27	July 18	July 25	Nov. 15	Nov. 27	Mar. 20
		July 30	Nov. 20		
Apr. 1	July 23			Dec. 2	Mar. 25
Apr. 6	July 28	Aug. 4	Nov. 25	Dec. 7	Mar. 30
Apr. 11	Aug. 2	Aug. 9	Nov. 30	Dec. 12	Apr. 4
Apr. 16	Aug. 7	Aug. 14	Dec. 5	Dec. 17	Apr. 9
Apr. 21	Aug. 12	Aug. 19	Dec. 10	Dec. 22	Apr. 14
Apr. 26	Aug. 17	Aug. 24	Dec. 15	Dec. 27	Apr. 19
		Aug. 29	Dec. 20		

DURING FARROWING

Farrowing Facilities

Farrowing units should be physically separated from the rest of the swine operation. When farrowing occurs monthly, the use of a series of separate farrowing buildings instead of a single unit allows buildings to be cleaned, disinfected, and "cooled down" for a few days before using again. Disease build-up is greatly reduced. For disease precaution, visitors and pets should be kept out of the farrowing house. A disinfectant foot bath should be located at the entrance of the farrowing unit for both animals and personnel to walk through.

The farrowing unit should provide warm, dry, and draft-free conditions for the baby pigs. Optimum temperature in the farrowing house for the comfort of the sow is 60 to 70°F. Temperature in the baby pig area should be 85 to 90°F. for the first few days of life. This temperature can be gradually lowered until the building temperature is reached.

If bedding material is used, it should be short and absorbent. Wood shavings, sawdust, or chopped or short bagasse is suitable material for bedding. The material used should not be excessively dusty.

Farrowing arrangements may consist of one of the following systems:

1. *Farrowing stall, stationary or flexible* (Figure 1)
   The use of farrowing stalls results in a minimum of pig losses due to crushing. Stalls require less overall floor space as compared with other systems. Stalls with wooden floors or pads help protect sows from cold concrete floors and avoid udder problems. Commercial farrowing stalls are available, or they may be built out of landing mat, pipe, or wood. Sows may be confined in the stall until weaning, or moved with the litter at 7 to 10 days after weaning. Dimensions for farrowing stalls are as follows:

   Length
   7 to 8 ft.

   Total width
   5 ft.

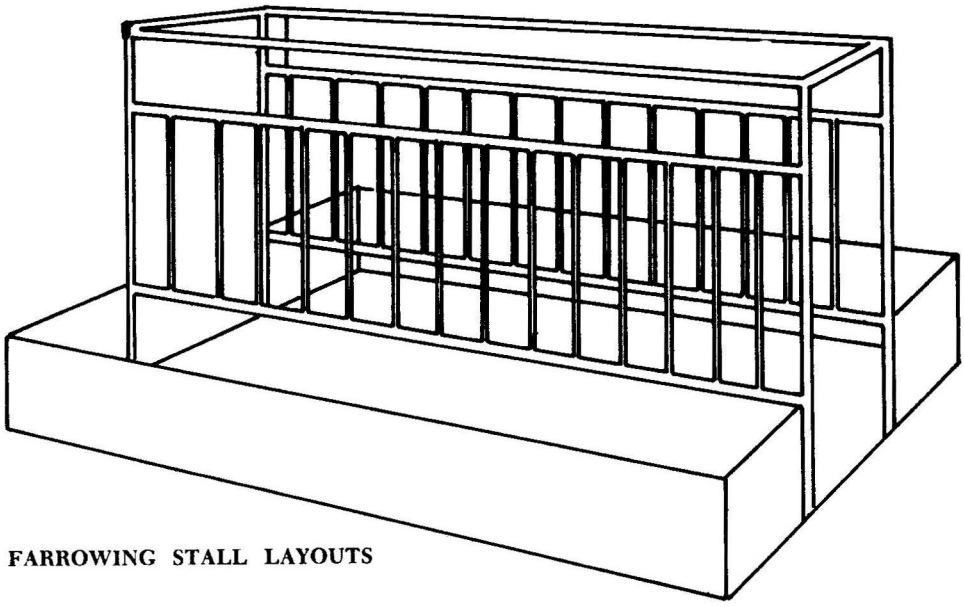
   Space for sow
   22 to 24 in. wide

   Space for pigs
   18 in. on either size, or 16 in. on one side and 20 in. on the other to allow easier placement of creep feeders and waterers.

2. *Conventional pen* (Figure 2)
   Pen size is normally 8 x 8 feet or 8 x 10 feet. Sows under 400 pounds body weight should be allowed a minimum of 55 square feet of floor space area. Sows over 400 pounds body weight should have 60 to 70 square feet of pen space. Guard rails 8 inches from the floor and 8 inches from the wall are necessary to minimize baby pigs being crushed. A creep area across one corner of the pen should be provided for the baby pigs.

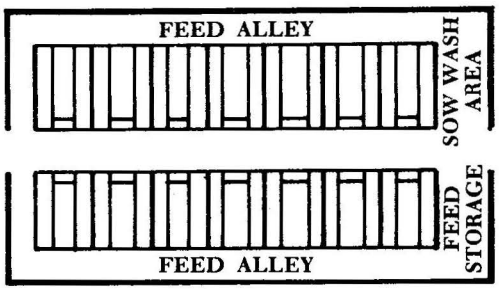
3. *Long narrow pen* (Figure 2)
   This type of farrowing pen affords better separation of dunging area from bedding area as compared with the conventional farrowing pen

Figure 1. Farrowing Stall.

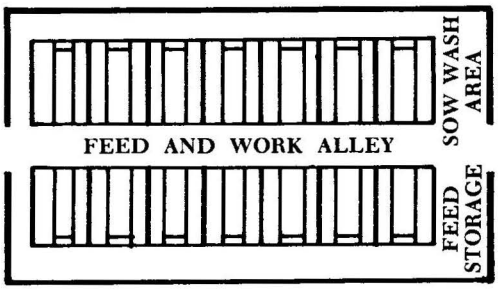


FARROWING STALL LAYOUTS

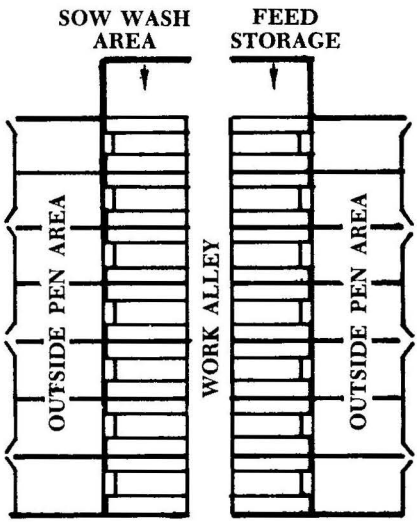
INSIDE ARRANGEMENT



SOWS FACE OUT

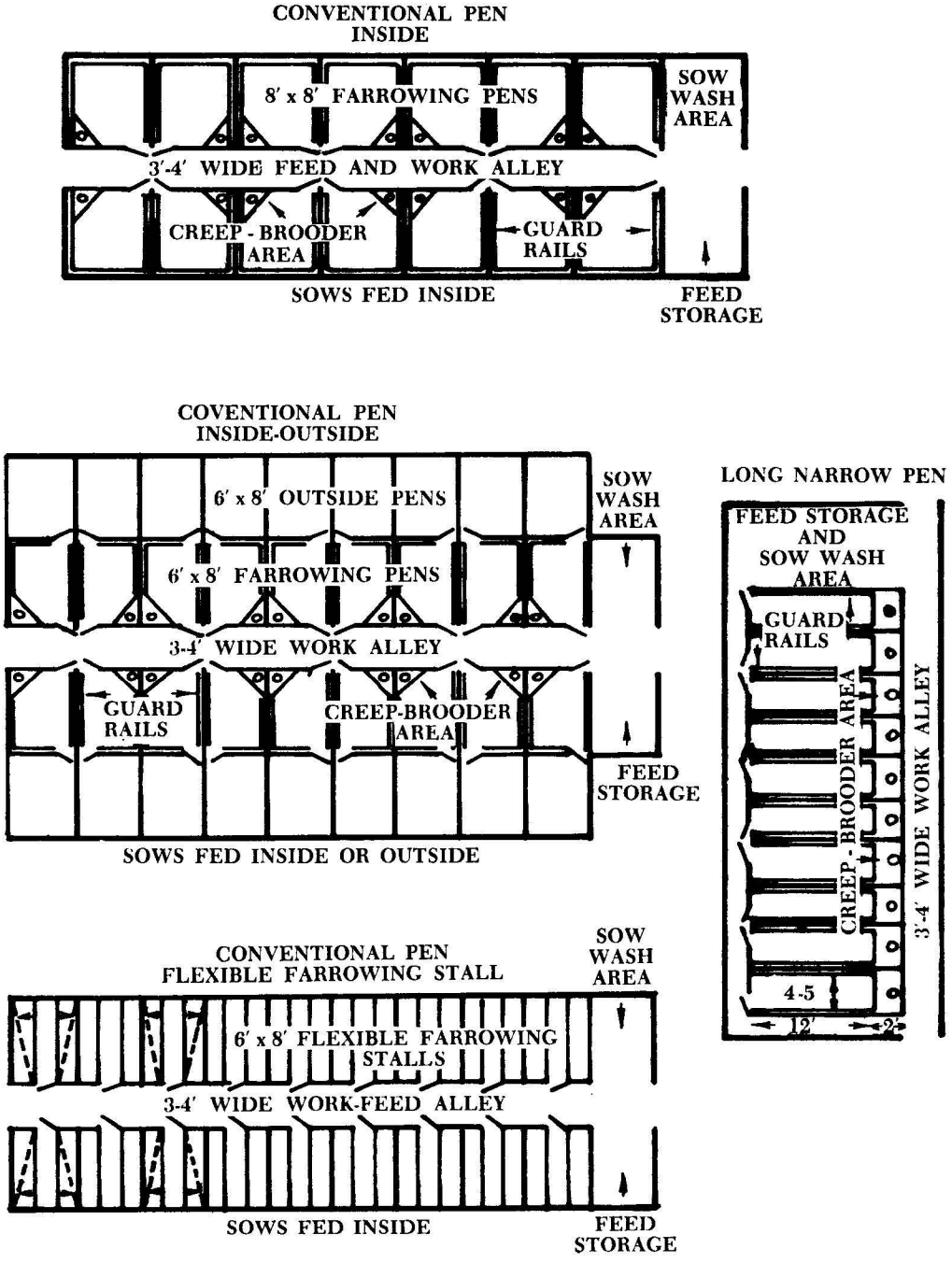


SOWS FACE IN



INSIDE ARRANGEMENT WITH OUTSIDE PENS

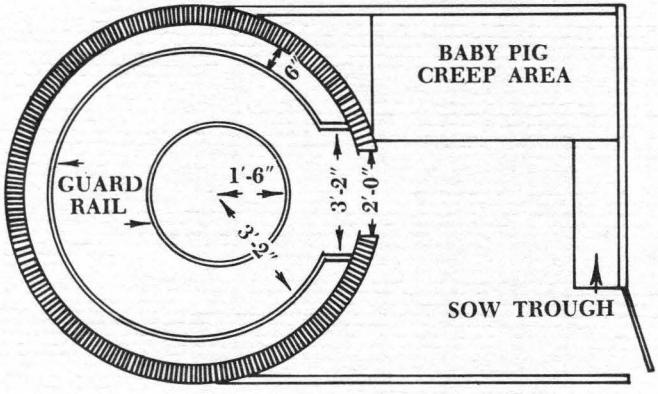
Figure 2. Farrowing pen arrangements.

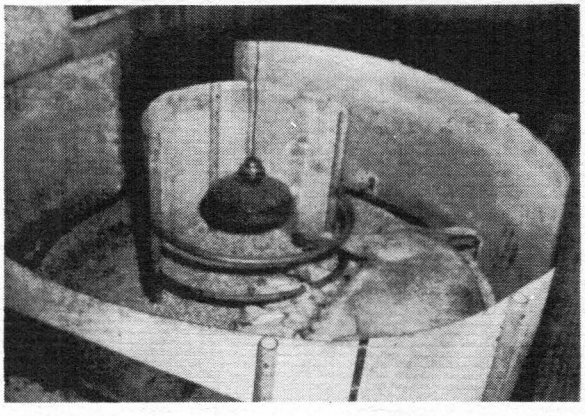


arrangement. Pen size is normally 4 to 5 feet wide and 14 to 16 feet long. Guard rails 8 inches high and 8 inches from the wall should be provided on both sides of the pen. A 2-foot creep area should be placed at one end of the pen.

4. *Round farrowing pen*
   (Figure 3)
   This system utilizes a round pen with the sleeping area for baby pigs located in the center. The circular structure, 7 feet 8 inches in diameter, contains a guard rail 6 inches above the floor and 6 inches from the wall surrounding the enclosure except at the entrance. There is also a guard rail 10 inches above the floor and another 20 inches above surrounding the 3-foot diameter area in the center. The sow lies with her udder toward the center area where the baby pigs are. Although the sow is confined at farrowing time, she is permitted to go in and out after farrowing is completed through a 2-foot entrance to the circular pen.

Figure 3. Round farrowing pen.





Care and Handling of Sow

It is always advisable for the producer to be with the sow at farrowing time. Remember, there is 4 months of feed invested in the sow in addition to breeding cost.

Nervous, vicious, or clumsy sows should have the pigs removed until farrowing is completed. If labor is prolonged, it is likely that the sow needs assistance and a veterinarian should be consulted. A long farrowing period will cause more pigs to die or be weakened during farrowing. Often the use of certain hormones (oxytocin) hastens farrowing. However, if oxytocin is to be given, it is extremely important that the neck of the uterus (cervix) be relaxed, otherwise damage to the uterus can occur. If the sow has given birth to some pigs, then you can be assured that the cervix is relaxed. Manual examination of the cervix will also determine if it is dilated. A person should not enter a sow unless he has been instructed on how to do so properly. The possibility of introducing infections into the sow at this time is great.

Mastitis (udder inflammation) and metritis (uterus infection) are evidenced by body temperature of 103 to 107°F., hot congested udders, loss of milk flow, and loss of appetite. These infections are often observed in sows at farrowing time. To reduce possible infection, an antibiotic injection may be given before and after farrowing. The operator should watch for sows that do not pass the placenta and for any discharge from the birth canal after farrowing. Afterbirth, dead pigs, and contaminated bedding material should always be removed from the pen since they can be a source of infection to the young pig. The sow's appetite and rectal temperature (normal body temperature is 102 to 103°F.) are good guides to use in determining the health condition of the sow during and after farrowing.

Feeding before and during the farrowing period should be regulated to take into consideration the reduction in exercise and possible feverish condition that may accompany farrowing. Adding to the ration a bulky feed ingredient, such as wheat bran or wheat millrun, can be considered if the sow appears to be constipated. On the day the sow farrows, it is not necessary to feed her unless she becomes restless. However, it is important that the sow have access to clean water at all times.

Care and Handling of Pigs

At birth, the membrane and mucus should be cleaned off the nose and mouth of the baby pig to prevent suffocation. Dry the pig with a clean rag and place the pig in a warm area. Often pigs appear dead when born. Sometimes it is possible to start breathing by removing the mucus covering the mouth and nose and gently slapping the sides of the pig. Artificial resuscitation can also be used to try to revive pigs that appear dead. One procedure is to hold the pig's mouth closed and circle the first index finger around the snout of the pig. By holding the lips to the circled finger and thumb, air can be blown into the pig's lungs.

The air is released from the pig's lung by squeezing the rib cage. Another procedure is to utilize a small plastic funnel over the pig's nose and mouth. The person blows into the stem, forcing air into the lungs of the nonbreathing pig. The procedure is as follows: 1. hold the pig by its hind legs with head down to drain fluid from its nose and mouth; 2. turn the pig with its head up and place the funnel over its mouth and nose; 3. blow forcefully into the funnel; 4. remove funnel and allow the pig to exhale; 5. repeat steps 2 to 4, 15 to 20 times per minute. After several repetitions, the pig should kick or show other signs of life. Lay the pig on its side or stomach and massage its chest and mouth. If it doesn't start breathing normally in a few seconds, resume artificial respiration. Only nonbreathing pigs whose hearts are beating should try to be revived.

To revive chilled pigs, dip them in water as warm as the hand can stand. Remove the pigs immediately, rub well with a dry cloth to stimulate circulation, and place in a warm place.

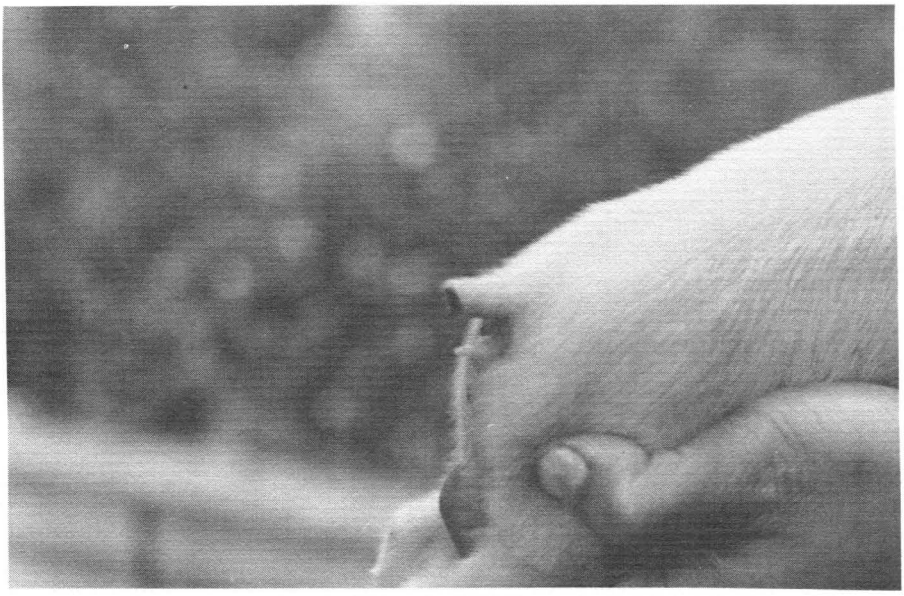
Weak or chilled pigs sometimes develop a condition called "hypoglycemia" because the sugar supply in their blood has been depleted. Symptoms in the early stages are often missed because weakness and reduced activity of the pig are not always detected. As the sugar level of the blood falls, affected pigs show decreased activity, uncertain and wobbly gait, head drawn backward or twisted to one side, cold skin, and a rough-appearing hair coat (hair standing upright). Some pigs respond to an under-the-skin injection of 5 to 10 cc. of a sterile 10 to 40-percent glucose solution. Another method that can be used is to dilute 1 to 2 teaspoons of corn syrup with an equal amount of warm water and feed this to the pig with a spoon or doser. The pigs should be treated every hour until they can be nursed successfully.

A sow should nurse her pigs during the first few hours after giving birth. Her first milk, called "colostrum", is high in the antibodies that provide protection against disease during the baby pig's early, critical stage of life. The baby pig's ability to absorb antibodies from colostrum milk decreases rapidly after birth, thus it is important for pigs to nurse early in life. If the pigs have difficulty in nursing, they should be assisted.

The navel cord should be tied off and severed 1 to 1½ inches from the body. "Navel ill", evidenced by swollen joints and stiff legs at a few days of age, is a common problem resulting from infection picked up by the newborn pig through its navel. An injection of antibiotic given to the baby pig at birth can be used as a precautionary measure. Prevention basically depends upon farrowing from healthy sows in sanitary surroundings.

Needle teeth should be clipped shortly after birth. Waiting longer increases possible injury from the clippers to the baby pig's jaw bone and increases the chance for injury to the sow's udder and other pigs. There are 8 of these needle, wolf,

Figure 4. Docking tails at birth prevents tail biting later.



or black teeth. Only the tips of the teeth should be removed. It is important not to clip close to the gum because of possible injury and subsequent infection. Either cuticle clippers or side cutting pliers can be used.

Some producers are docking pig tails at birth to prevent tail biting that may occur later on. This can be done at the same time the needle teeth are clipped, by using side cutting pliers and clipping the tail ⅜ to ½ inch from the body. (Figure 4)

AFTER FARROWING
CARE AND HANDLING OF THE PIGS

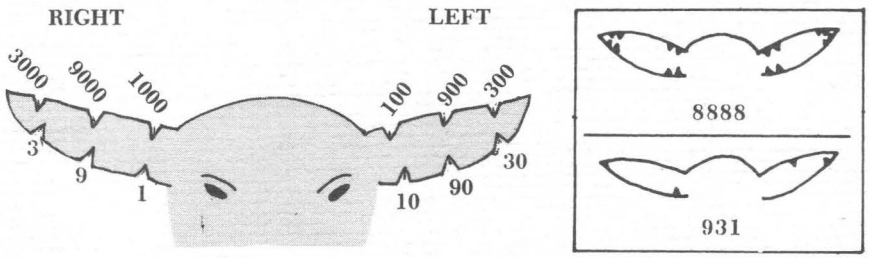
Earmarking

Pigs—at least the gilt pigs in the litter—should be ear notched within 24 to 36 hours after birth. Pigs must be so identified if production records are to be kept for future selection of the better performing females. Figure 5 illustrates one system for ear notching pigs. The system provides for the identification of litters by 10's starting with litter 0 and going to 10, 20, 30, 40, etc., to 9990. Pigs within litters are numbered individually starting with 0 (no mark) and running consecutively to 9. This takes care of 10 pigs. If only the gilts within a litter are notched, it is very unlikely that they will ever exceed 10 in number, and no duplication of notch numbers within a litter will occur. If both males and females within a litter are to be notched, it is best to notch pigs of one sex first. Then, if there are more than 10 pigs in a litter, although some may have the same notch number, they will be of the opposite sex.

Transferring Pigs

By 3 days of age, pigs should be transferred from one sow to another to even up litters and to prevent runts. Pigs can be successfully moved to even up litters when 2 or more sows farrow within 48 hours of one another. Sections of the sow's udder not being used soon cease their milk production. The stronger pigs from a litter should be transferred since they have a better chance of competing with strange pigs. To make sure that the new pigs are accepted, the sow should be separated from her own litter for a while when the new pigs are combined. A disinfectant or bedding material can be rubbed over all the pigs to disguise the odor.

Figure 5. Directions for numbering litters and pigs by ear notching.



The system illustrated provides for the individual notching of ears and numbering the pigs individually from 0 to 9999. The left ear and upper right ear carries the litter number. The lower right ear carries the individual pig number. Each pig's number and identification is, however, the total of its litter number and individual number in its litter. For instance, pig number 118 carries the litter mark 100 and 10 and the individual mark within the litter is 8; thus his number is 118. The diagram illustrates all the notches used in this system. No one pig would, however, have all the notches indicated.

Orphan Pigs

Orphan pigs can be raised on a foster sow or given a commercial milk replacer. If commercial milk replacers are not available, a satisfactory milk replacer can be made using one egg yolk and one tablespoon of corn syrup to one quart of cow's milk. For pigs raised artificially, the temperature of the milk replacer fed during the first few days should be 98 to 100°F. Feeding should be done every 2 to 3 hours at the rate of 2 oz. per feeding per pig. Thereafter, the feeding interval can be lengthened and the milk replacer fed at room temperature. A shallow pan may be used for feeding. Immersing the baby pig's nose in the milk a few times teaches him to drink readily. It is extremely important that all feeding utensils be kept sanitary; otherwise scouring can occur.

Use of Supplemental Heat

At birth and shortly after, the temperature requirement of baby pigs is 85 to 90°F. The use of heat lamps can (1) provide warmth to the baby pigs, (2) attract the pigs away from the sow so that there is less danger of crushing, and (3) help keep the floor area dry.

A 250-watt infra-red heat lamp is commonly used. Rules for safe use of heat lamps are:

1. Suspend heat lamps 24 to 30 inches above the floor over the pig area.
2. Keep the lamp cord out of reach of the sow.
3. Do not suspend the lamp from the electric cord.
4. Locate the electric outlet over the lamp and use a short electric cord so that the lamp will unplug if it falls.

After the pigs are 7 to 10 days old, the heat lamp can be turned off during the day and left on at night only if the temperature warrants it.

Nutritional Anemia Control

Pigs raised in confinement with access to only sow's milk become anemic. Anemic pigs show listlessness, rough haircoat, wrinkled skins, drooping ears and tails, pale membranes around mouth and eyes, and labored breathing. Any of the following anemia prevention methods may be used.

1. Inject an iron solution into baby pig at 2 to 3 days of age. If pigs remain in confinement and do not have access to creep feed at an early age, an additional injection at 2 to 3 weeks of age is desirable.

Figure 6. To prevent anemia an iron solution is injected into the pig.

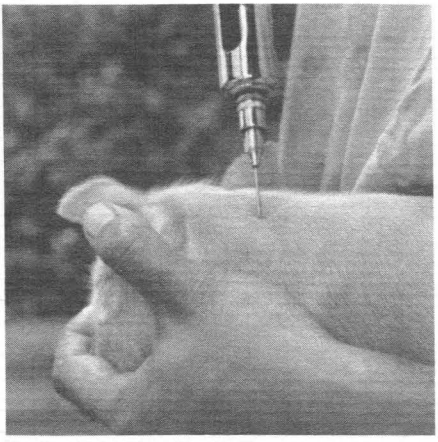


Table 3. Nutrient requirements of young growing pigs[1]

	Requirements expressed in percentage or amount per pound of total ration			Amounts per animal per day		
Liveweight, lb	10-25.	25-45.	45-80.	10-25.	25-45.	45-80.
Expected daily gain, lb	0.7	1.1	1.3	0.7	1.1	1.3
Feed intake (air dry), lb	—	—	—	1.3	2.7	3.7
Protein and energy:						
Crude protein[2]	22.0%	18.0%	16.0%	0.3 lb	0.5 lb	0.6 lb
Total digestible nutrients[3]	80.0%	80.0%	75.0%	1.0 lb	2.2 lb	2.8 lb
Digestible energy[3], kcal	1,585.0	1,585.0	1,500.0	2,100.0	4,370.0	5,610.0
Metabolizable energy[3], kcal	1,525.0	1,525.0	1,440.0	2,020.0	4,200.0	5,390.0
Inorganic nutrients:						
Calcium	0.80%	0.65%	0.65%	4.8 g	8.1 g	11.0 g
Phosphorus	0.60%	0.50%	0.50%	3.6 g	6.3 g	8.5 g
Salt (NaCl)	0.50%	0.50%	0.50%	—	2.9 g	3.9 g
Vitamins:						
B-carotene, mg[4]	2.0	1.6	1.2	2.6	4.4	4.4
Vitamin A, I.U.	1,000.0	800.0	600.0	1,300.0	2,200.0	2,200.0
Vitamin D, I.U.	100.0	90.0	90.0	132.0	250.0	340.0
Vitamin E, mg	5.0	5.0	5.0	6.6	13.8	18.7
Thiamine, mg	0.6	0.5	0.5	0.8	1.4	1.9
Riboflavin, mg	1.4	1.4	1.2	1.8	3.8	4.4
Niacin[5], mg	10.0	8.2	6.3	13.2	22.5	24.0
Pantothenic acid, mg	6.0	5.0	5.0	7.8	13.8	18.7
Vitamin B_6, mg	0.7	0.7	0.5	0.9	1.9	1.9
Choline, mg	500.0	408.0	—	660.0	1,125.0	—
Vitamin B_{12}, mcg	10.0	7.0	5.0	13.2	18.8	18.7

[1]Adapted from National Research Council, Committee on Animal Nutrition, Nutrient Requirements of Swine, 7th rev. ed., National Academy of Sciences Publication No. 1599, Washington, D.C., 1973.

[2]Approximate protein levels required to meet the essential amino acid needs. If cereal grains other than corn are used, an increase of 1 or 2 percent protein may be required.

[3]These suggested energy levels are derived from corn-based diets. When barley or medium- or low-energy grains are fed, these energy levels will not be met. Formulations based on barley or similar grains are satisfactory for pigs weighing 50-220 pounds, but feed conversion will normally be reduced with lower energy diets.

[4]Carotene and vitamin A values are based on 1 mg of B-carotene equaling 500 I.U. of biologically active vitamin A. Vitamin A requirements can be met by carotene or vitamin A or both.

[5]It is assumed that all the niacin in the cereal grains and their byproducts is in a bound form and thus largely unavailable.

2. Place clean soil in the farrowing pen daily. Soil should not be contaminated with parasite eggs and other disease organisms. Iron sulfate can be sprinkled over the soil.
3. Give the pigs iron tablets or paste at 2 to 3 days of age. Repeat the treatment every 7 to 10 days until the pigs are eating creep ration adequately. If pills are given, it is important to see that the pigs swallow them and not spit them out.
4. Swab sow's udder daily with a solution of 1 pound iron sulfate dissolved in 1 gallon of warm water.
5. Give the baby pigs a solution of 1 pound iron sulfate and 1 ounce copper sulfate dissolved in 1 quart of warm water. One teaspoonful a week should be given to the young pigs until they are eating creep feed adequately.

Creep Feeding

Baby pigs should have access to a creep feed at 7 to 10 days of age. Commercial pre-starters and starters are readily available or farm-mixed creep rations (Table 4) can be used. Pigs should receive a total of 3 to 5 pounds of pre-starter and then switched to starter until they weigh about 40 pounds. Early availability of a quality creep feed to young pigs will result in:

1. More uniform pigs with less runts.
2. Heavier weaning weight.
3. Less mortality of baby pigs.
4. Decrease in incidence and severity of baby pig scours.
5. Less set-back to young pigs when weaned from the sow. The earlier pigs are to be weaned, the more important it is that they are eating dry feed at an early age.
6. Less weight loss by the sow.

For successful creep feeding, the following tips are offered:

1. At first, give the baby pigs only a handful of creep feed, replenished daily. The creep feed should not be allowed to become stale or contaminated. Place feed in flat pans or sprinkle on the top of dirt placed on the floor.
2. Once the pigs have started to eat readily, place the ration in a creep feeder so that the pigs have access to the ration at all times. One linear foot of feeder space should be provided for each 5 pigs. The edge of the feeder trough should not be more than 4 inches above the floor. For increased consumption of creep ration, the feeder should be located close to the waterer for the baby pigs.
3. Make clean, fresh water available to the young pig in a waterer. It is not sufficient to rely on the waterer for the sow to furnish water to the baby pigs.
4. The creep area should be light, warm, dry, and draft-free. It should be located in an area where the pigs are the least disturbed. Excitement, noise, and a change in feeding rou-

tine affect eating habits and subsequent feed consumption. Having the creep area near the sleeping area encourages more frequent eating. Arrange the creep area in such a way that it can be cleaned, and feed and water can be supplied conveniently without the producer getting into the area.

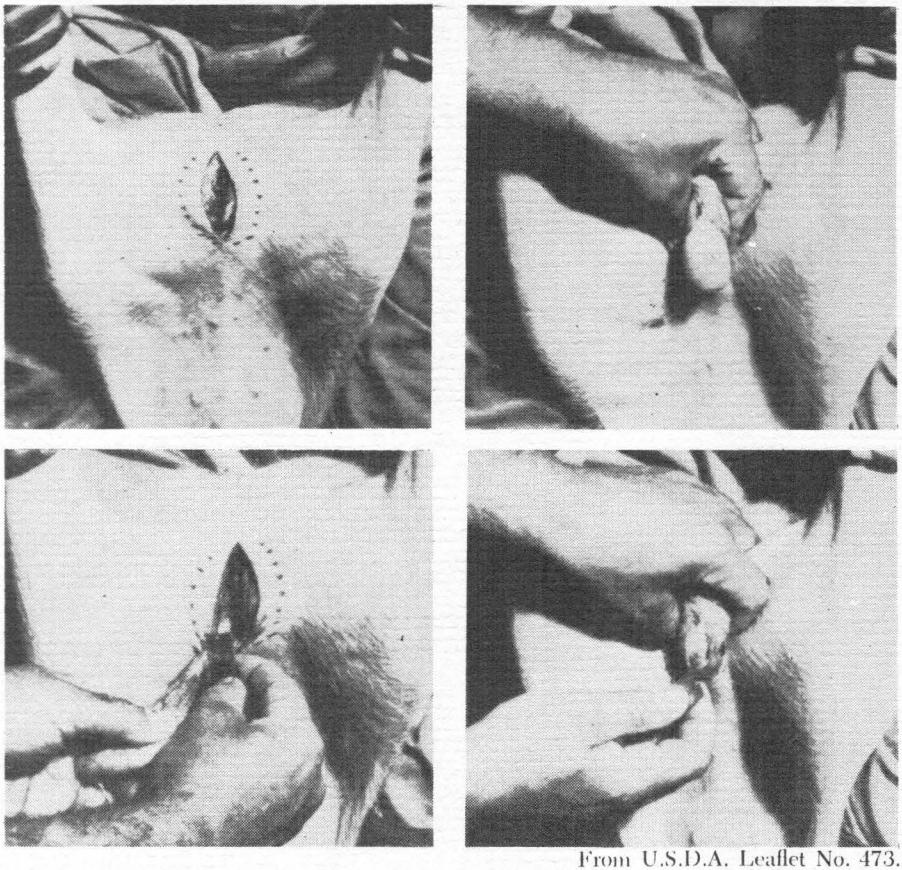
5. Individual litter creep areas are preferable. Where several litters have access to one creep area, it is advisable to limit the number of pigs to about 40 per creep.

Table 4. Sample creep rations (18% crude protein).

Ingredients	Ration A	Ration B	Ration C	Ration D
	LB.	LB.	LB.	LB.
Corn—Milo	585	570	479	570
Soybean oil meal (44%)	220	185	217	125
Tuna meal (60%)	50	50	30	50
Meat and bone meal (45%)	—	—	20	50
Powdered skim milk or milk replacer	—	50	50	50
Middlings	30	30	—	—
Alfalfa meal, dehydrated	—	—	—	50
Molasses	—	—	150	100
Sugar	100	100	—	—
Stabilized lard	—	—	50	—
Trace mineral salt*	5	5	5	5
Ground limestone	5	5	4	—
Dicalcium phosphate or steamed bone meal	5	5	—	—
Vitamin pre-mix	To be added at level recommended by manufacturer.			
Antibiotic	Minimum of 50 gms. per ton of complete ration.			

*Trace mineral salt to contain 0.5% zinc or add 50 gm. zinc sulfate per 1000 lbs. of complete ration.

Figure 7. Castration procedure.



From U.S.D.A. Leaflet No. 473.

1. **Make the incision between the testicles as deep as a testicle is thick and twice as as long as a testicle.**
2. **Squeeze the first testicle out through the incision.**
3. **Pull the testicle lightly to stretch the cord. Place knife or single-edge razor blade against the cord near the edge of the incision and cut the cord.**
4. **Make a smaller incision inside the main incision to expose the second testicle.**

Castration

Boar pigs should be castrated by the time they are 2 weeks old. Less infection and shock will result. The latest time to castrate should be 7 to 10 days before weaning. Use sterile instruments and make incisions low for proper drainage. Figure 7. illustrates one method of castration.

External Parasites

Sows and young pigs should be examined periodically for lice and mange infestation and treated accordingly. It is best to delay treatment until pigs are over 6 weeks old to reduce possible toxic effects. Consult your County Agricultural Agent for further information.

Scouring in Pigs

One of the major problems facing the swine producer is scouring in baby pigs. It is estimated that about 20 percent of pig losses between farrowing and weaning is caused by scouring. Enteritis or scours should be looked upon as a symptom that some disturbance is affecting the pig's gastro-intestinal tract. Scouring in pigs may be due to feeding practices, management practices, environment, and disease. The following lists conditions that may cause scouring in baby pigs:

1. Overly fat sows at farrowing time.
2. Overfeeding of sows just before or immediately after farrowing.
3. Sudden changes in the ration or feeding program of the sow during the last few days of gestation and at farrowing.
4. Constipation of sows.
5. Stale, dirty creep feed.
6. Dirty pens. Bacterial scours is frequently found in young pigs where poor sanitary conditions exist.
7. Bringing sows from infected lots directly into farrowing facilities without cleaning the sows. A young pig's first mouthful of milk should not not contain harmful bacteria and parasite eggs.
8. Cold, drafty, wet farrowing pen floors.
9. Chilling of young pigs.
10. Failure of baby pigs to receive colostrum from the sow. Pigs that do not obtain colostrum are susceptible to scours because they do not have the antibody protection from the milk.
11. Dirty baby pig waterers and feeders.
12. Stress conditions on young pigs resulting from changes in operational practices. It is not advisable to wean, move, and change feeds all at the same time.
13. Sudden changes in environmental temperature or weather conditions. Small pigs should be raised in buildings where weather variations can be controlled.
14. Disease build-up in the farrowing unit. This is a major factor in perpetuating scouring conditions. Bacteria that are passed on successively through susceptible animals become more virulent. That is, they tend to develop an increased ability to cause disease. In a continuous farrowing system, these higher virulent organisms remain in the unit and infect litters soon after birth.
15. Fever in sows. A condition such as metritis or mastitis may cause a rise in the sow's temperature and liberation of toxins causing scouring.
16. Anemia in baby pigs.
17. Dead pigs and accumulated infected manure and bedding material in the pen.
18. Diseases such as T.G.E., necrotic enteritis, or bloody dysentery.

Weaning of Pigs

In the past, 8 weeks was the standard age for weaning pigs. Today, because quality pre-starters and starter rations are available, and because of improved feeding and management practices, earlier weaning is practical. The optimum time for weaning depends on the producer's management ability and facilities. The earlier the pigs are weaned, the better the feeding and management practices must be. Under most Hawaiian hog farm conditions, the earliest age to consider weaning pigs would be 3 to 4 weeks.

Advantages of early weaning are:

1. Heavier pigs at 8 weeks of age with fewer runts.
2. Lower sow feed costs.
3. More litters per year.
4. Less weight loss of the sow.
5. Greater flexibility in rebreeding or selling sows.
6. Greater turnover of sows through the farrowing unit; hence less total farrowing area space required.

For best results in early weaning of pigs, the following recommendations should be followed:

Age in weeks	5	4	3	2	1
Minimum pig wt. (LBS.)	21	15	12	9	5
Farrowing house temperature (°F.)	60	65	70	70	75
Minimum floor space per pig (SQ. FT.)	6	5	4	4	4
Maximum number of pigs per linear foot of feeding space	4	4	4	5	5
Maximum number of pigs per linear foot of water space	10	10	12	12	12
Maximum number of pigs per group	25	20	10	10	10

AFTER FARROWING
CARE AND HANDLING OF THE SOW

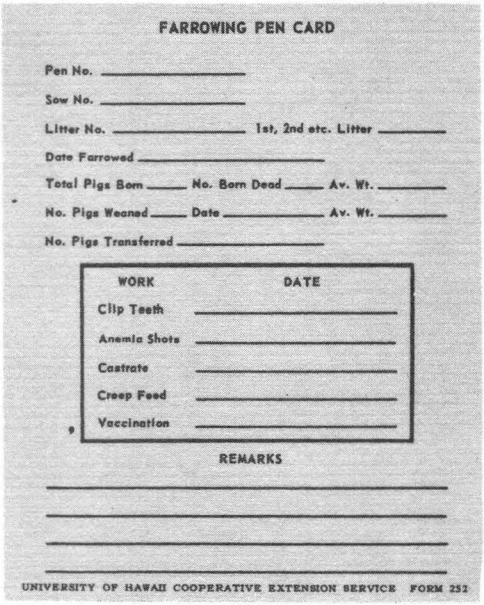
Farrowing Records

Complete information on the farrowing performance of each sow should be recorded. For each sow, information should include:

1. Date farrowed.
2. Litter no. (1st, 2nd, etc.).
3. Number of pigs farrowed (live and dead).
4. Number of pigs weaned.
5. Date weaned.
6. Weaning weight.

Forms for this type of record-keeping are available from the University of Hawaii Cooperative Extension Service (Forms 252, 271) (Figures 8 and 9).

Figure 8. Sample of form for farrowing records.



FARROWING PEN CARD

Pen No. _____

Sow No. _____

Litter No. _____ 1st, 2nd etc. Litter _____

Date Farrowed _____

Total Pigs Born ____ No. Born Dead ____ Av. Wt. _____

No. Pigs Weaned ____ Date _____ Av. Wt. _____

No. Pigs Transferred _____

WORK	DATE
Clip Teeth	
Anemia Shots	
Castrate	
Creep Feed	
Vaccination	

REMARKS

UNIVERSITY OF HAWAII COOPERATIVE EXTENSION SERVICE FORM 252

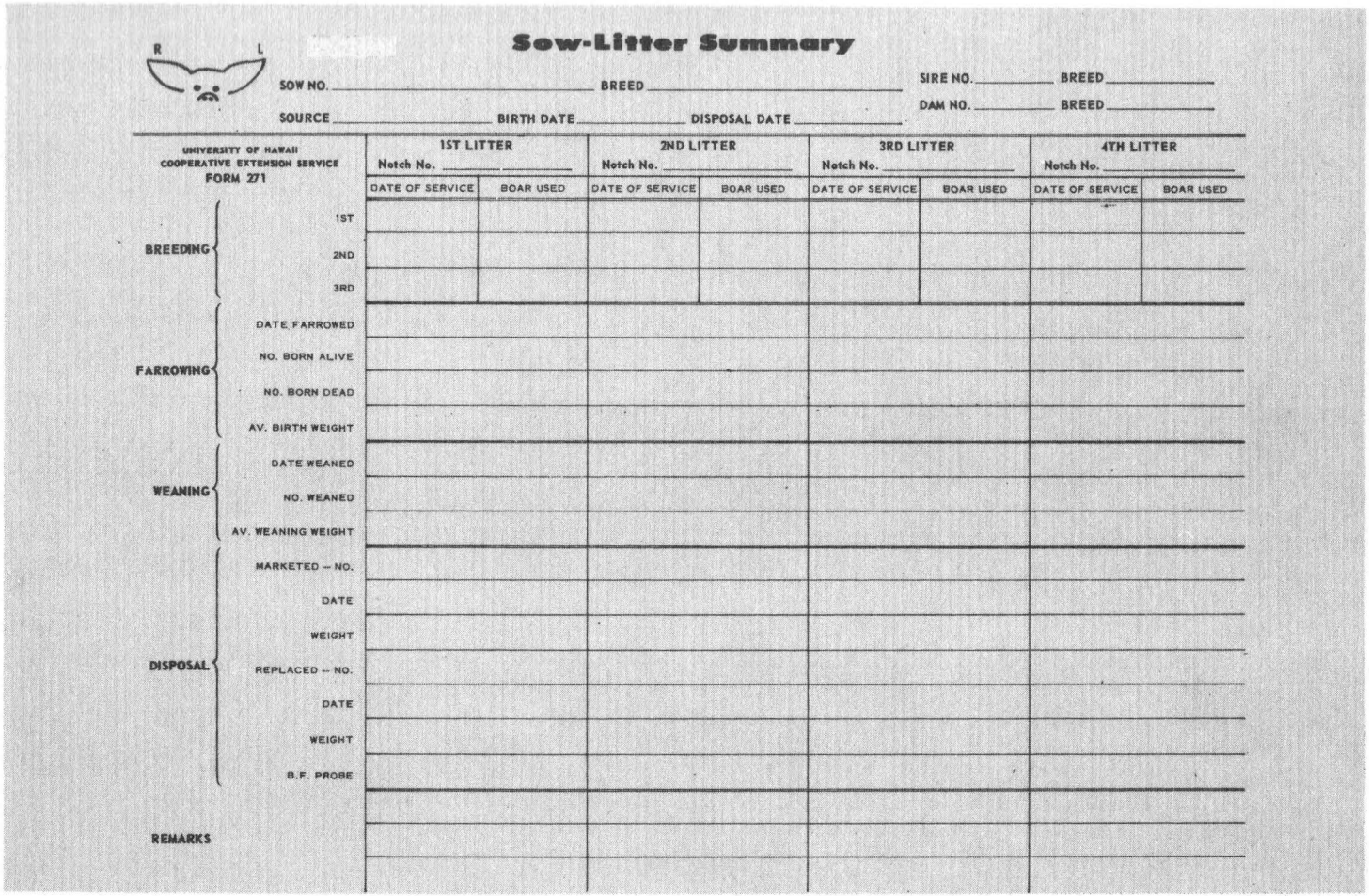
Combining Sows and Litters

Best performance results occur if sows and litters are kept separate until weaning. If this is not possible, sows and litters should be kept separate until 2 weeks of age before bringing them together. It is advisable not to run more than 4 sows and litters together in one lot when in confinement. Six sows and litters can be run together when on pasture. Age differences of litters held together should not be more than 1 week apart in a confinement unit or 2 weeks apart when run on pasture. On pasture, the recommended shade or shelter area is 50 square feet per gilt and litter and 60 square feet per sow and litter.

Feeding the Sow During Lactation

During lactation, grain rations similar to those fed during gestation are suitable for feeding. The main difference is the quantity of feed offered. The use of garbage, however, should be restricted during this period. Two systems of sow feeding practices may be followed: hand-feeding and self-feeding. When hand-feeding, increase the daily feed after farrowing according to the appetite and apparent needs of the sow. By 7 days, the sow should be on full feed. A rule of thumb that may be used as a *guide* in hand-feeding sows during lactation is to allow 1 pound of feed per 100 pounds body weight of sow plus 1 pound of feed for each pig in the litter. Thus, a 400-pound sow nursing 8 pigs would be given 12 pounds of feed daily.

Figure 9. Sample of form for recording sow's performance.



Sow-Litter Summary

R L

SOW NO. _____ BREED _____ SIRE NO. _____ BREED _____

SOURCE _____ BIRTH DATE _____ DISPOSAL DATE _____ DAM NO. _____ BREED _____

UNIVERSITY OF HAWAII
COOPERATIVE EXTENSION SERVICE
FORM 271

		1ST LITTER Notch No. _____		2ND LITTER Notch No. _____		3RD LITTER Notch No. _____		4TH LITTER Notch No. _____	
		DATE OF SERVICE	BOAR USED	DATE OF SERVICE	BOAR USED	DATE OF SERVICE	BOAR USED	DATE OF SERVICE	BOAR USED
BREEDING	1ST								
	2ND								
	3RD								
FARROWING	DATE FARROWED								
	NO. BORN ALIVE								
	NO. BORN DEAD								
	AV. BIRTH WEIGHT								
WEANING	DATE WEANED								
	NO. WEANED								
	AV. WEANING WEIGHT								
DISPOSAL	MARKETED — NO.								
	DATE								
	WEIGHT								
	REPLACED — NO.								
	DATE								
	WEIGHT								
	B.F. PROBE								
REMARKS									

Table 5. Nutrient requirements of lactating females[1]

	Requirements expressed in percentage or amount per pound of total ration Lactating gilts and sows	Lactating gilts	Lactating sows
Liveweight, lb	310-440.	310-440.	440-550.
Total air dry feed requirement, lb	—	11.0	12.0
Protein and energy:			
Crude protein	15.0%	1.65 lb	1.82 lb
Total digestible nutrients	75.0%	1.80 lb	9.10 lb
Digestible energy, kcal	1,500.0	16,500.0	18,150.0
Metabolizable energy, kcal	1,400.0	15,840.0	17,420.0
Inorganic nutrients:			
Calcium	0.75%	37.5 g	41.2 g
Phosphorus	0.50%	25.0 g	27.5 g
Salt (NaCl)	0.50%	25.0 g	27.5 g
Vitamins:			
B-carotene, mg	3.0	33.0	36.3
Vitamin A, I.U.	1,500.0	16,500.0	18,150.0
Vitamin D, I.U.	100.0	1,100.0	1,200.0
Vitamin E, mg	5.0	55.0	60.5
Thiamine, mg	0.5	5.0	5.5
Riboflavin, mg	1.6	17.5	19.3
Niacin, mg	8.0	87.5	96.3
Pantothenic acid, mg	6.0	65.0	71.5
Vitamin B_{12}, mcg	5.0	55.0	60.5

[1]Adapted from National Research Council, Committee on Animal Nutrition, Nutrient Requirements of Swine, 7th rev. ed., National Academy of Sciences Publication No. 1599, Washington, D.C., 1973.

If sows are turned out of the farrowing pen to eat, give them adequate time to eat. Sows can be turned out twice daily for feeding, watering, and exercise. If sows are being hand-fed in groups, allow 1½ linear feet of trough space for each sow and litter, provided the pigs have additional creep feeding space.

When self-feeding, place the feeder in the pen at farrowing time. Allow 1 linear foot of self feeder space or 1 self feeder hole per sow and litter, provided the young pigs have additional creep feeding space.

An adequate supply of clean water must be available for maximum milk production. The use of automatic waterers is preferred. One automatic watering cup accommodates 4 sows and litters if sows are run together. When hand-watering, provide a minimum of 6 gallons of water daily per sow and litter. If watering is done in a trough, allow 2 linear feet of trough space per sow and litter.

Sows Failing to Give Milk

Occasionally, sows that have farrowed fail to milk, a condition called "agalactia." In many instances, the use of hormones, such as pituitary extract, can start milk flowing. Often it is possible to start milk flow by applying hot packs to the udder followed by massaging vigorously. If efforts to initiate milk production fail, it is advisable to transfer the baby pigs to other sows or to provide supplemental milk. Conditions that can result in non-milking of sows are:

1. Improper feeding of the sow either before or after farrowing.
2. Insufficient intake of water.
3. Constipation or sickness of sows.

Table 6. Sample lactation rations (15% crude protein), self- or full-fed to nursing sows.

Ingredients	Ration A	Ration B	Ration C	Ration D	Ration E
	LB.	LB.	LB.	LB.	LB.
Corn–Milo–Barley	785	800	820	575	310
Millrun–Middlings	—	—	—	—	200
Molasses	—	—	—	200	250
Soybean oil meal (44%)	190	125	110	155	105
Tuna meal (60%)	—	—	55	40	50
Meat and bone meal (45%)	—	65	—	20	30
Alfalfa meal, dehydrated	—	—	—	—	50
Trace mineral salt*	5	5	5	5	5
Steam bone meal–Dicalcium phosphate	10	5	5	—	—
Ground limestone	10	—	5	5	—
Vitamin pre-mix	To be added at levels recommended by manufacturer.				

*Trace mineral salt to contain 0.5% zinc or add 50 gm. zinc sulfate per 1000 lbs. of complete ration.

4. Chilling and exposure in cold, damp quarters.
5. Contagious diseases, such as erysipelas, leptospirosis, and T.G.E.
6. Non-contagious diseases, such as metritis, milk fever, or mastitis.
7. Rough treatment and handling sows.
8. Overfat or run-down condition in sows.

Culling Sows at Weaning

At weaning time, sows should be evaluated to determine which ones are to be culled from the herd and which ones will be retained. Factors used to determine keeping sows in the herd at this time are:

1. Temperament.
2. Milking ability.
3. Performance of the litter—number of pigs weaned and weaning weight of pigs.
4. Injury or disorders to the sow.
5. Hereditary abnormalities in the litter, such as cryptorchidism and scrotal hernia.

Rebreeding Sows

During lactation, incidence of heat periods is low. Heat periods rarely occur before the 4th or 5th week. Sows may exhibit a postpartum heat period during the first 3 to 4 days after farrowing and will accept the boar. Normally, however, this is a sterile heat due to failure of ova to be released from the ovary. In instances where a litter dies or is removed from the sow soon after farrowing, a fertile heat period will occur on the 10th to 20th day after farrowing. When pigs are weaned, sows normally come into heat a few days after—3 to 4 days if weaned at 8 weeks, 6 to 9 days if weaned under 3 weeks of age. Sows in good physical condition can be bred on the first heat period after weaning, although sows from which pigs were weaned early release less ova than sows weaned at a later age. For increased litter size, two services per heat is recommended—one on the first day and one on the second. Sows in poor condition or exhibiting fever should be deferred from breeding until later.

Checklist—Schedule of Operations

Before Farrowing

1. 3 to 4 weeks before farrowing vaccinate for erysipelas, if warranted.
2. 10 to 14 days before farrowing, worm sows.
3. Check sows for lice and mange and treat accordingly. (Consult your County Agricultural Agent.)
4. Clean and disinfect farrowing pen thoroughly before moving animals in.
5. Keep people, rodents, pets, birds out of the farrowing house.
6. 3 to 7 days before farrowing wash sow and put in the farrowing stall or pen.
7. Adjust ration, if needed, to avoid constipation.
8. Provide floor protection to prevent knee abrasions on baby pigs when nursing.

Farrowing Day

1. Be with the sow.
2. Use heat lamps for pigs, if needed.
3. Handling of pigs:
   wipe off mucus and dry with clean rag
   tie off navel cord and disinfect
   clip needle teeth
   ear notch pigs
   assist pigs to nurse
   dock tails if desired
4. Remove afterbirth and soiled bedding from the farrowing area.
5. Make water available to the sow.
6. Transfer pigs and even up litters.
7. Record farrowing information on farrowing pen cards.

Day after farrowing

1. Feed sow according to appetite
2. Provide fresh water at all times to sow and pigs
3. Take sow's temperature daily for first few days after farrowing.

1 to 3 days after farrowing

1. Treat pigs for anemia prevention.

7 to 10 days after farrowing

1. Provide creep feed to baby pigs.
2. Sows should be on full feed by now.

14 days after farrowing

1. Boar pigs should be castrated by now.

3 to 8 weeks after farrowing

1. Wean pigs.
2. Cull sows as required.
3. Worm and rebreed sows according to condition and health.

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   Feeding & Management of Growing-finishing pigs. Circular 429.
   Management & Feeding of the Swine Breeding Herd. Circular 417
   Computing and Balancing Swine Rations. Circular 439.
   Emergency Feeding of Swine. Circular 399.
   Breeding Stock Selection for Commercial Swine Production. Circular 422.
   Crossbreeding for Commercial Swine Production. Circular 406.
   Slotted Floors for Swine. Circular 413.

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